



## I. CLAIMS

1. (canceled)
2. (canceled)
3. (canceled)
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7. (canceled)
8. (canceled)
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10. (canceled)
11. (canceled)
12. (canceled)
13. A method of creating a photoelectrode adapted to liberate a gas present in a material using incident light, comprising:
  - a. fabricating a first semiconductor layer onto a substrate to form a contact interface between the first semiconductor layer and the substrate, the contact interface comprising an electrical contact with the substrate;
  - b. fabricating an interface layer onto a surface of the first semiconductor layer opposite the contact interface with the substrate; and
  - c. fabricating a photoactive semiconductor layer onto the interface layer.
14. The method of claim 13, further comprising fabricating the first semiconductor layer as a plurality of semiconductor layers.

15. The method of claim 14, wherein the plurality of semiconductor layers form a photovoltaic junction.

16. A method of producing a gas from a material containing constituent materials of the gas, comprising:

- a. placing a semiconductor device for production of a gas into a material containing constituent materials of the gas, the semiconductor device comprising a substrate; a first semiconductor layer disposed on the substrate; a photoactive semiconductor top layer further comprising a photoelectrochemical electrode junction; and an interface layer disposed between the semiconductor layer and the photoactive semiconductor top layer; and
- b. exposing a surface of the photoactive semiconductor top layer to both a source of light and the material.

17. The method of claim 16, wherein:

- a. the source of light is the sun;
- b. the material is a liquid electrolyte; and
- c. the gas is at least one of (a) hydrogen or (b) oxygen.